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A METABOLISM CRATE FOR SWINE

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In response to many requests for drawings of the swine metabolism crate devised by the writer the following figures and notes are submitted. The objects which we sought to attain in the planning of this crate were (1) comfort and freedom of movement of the animal, (2) free circulation of air, and (3) the accurate collection, without admixture or contamination, of the excreta. The apparatus has been used, in series of five, during many months' continuous work with entire satisfaction. It has been used with barrow swine only, it being our judgment that it would prove imperfect for work with sows.

The illustration on page 79 shows four of the metabolism crates, in series, this arrangement allowing the cleaning tables to be pushed from one to another conveniently.

The illustration on page 80 shows a metabolism crate with the movable upper portion pushed over onto a cleaning table to the left. This upper portion is on small wheels which run in grooves in the framework of the lower part of the apparatus, and in the framework of the cleaning table. As the upper portion of the crate is pushed over onto the cleaning table the pig walks along with it. With the apparatus in this position the pig is given any such brushing or scrubbing as may be desired. The top of the cleaning table drains to an outlet and is lined with galvanized iron. In order to prevent the pig from slipping on this smooth floor, when it is wet, a piece of hardware cloth with iron rods in the edges to hold them down, is used for the pig to stand upon.

This plate also shows the screens and cloth of the metabolism crate elevated to exhibit their relation one to another. The pig stands upon the upper screen. The lower screen is very light. It is supported by the hopper or pan in the bottom of the apparatus, and is used only to support a light piece of cloth which retains feces falling through the upper screen. The urine bottle is shown in place beneath the apparatus.

The cleaning table to the right is a duplicate of the one to the left, upon which the upper portion of the crate now rests. It is used to support the upper screen while it is being scrubbed and during the cleaning of the cloth and hopper. Both cleaning tables run on casters with felt wheels.

Fig. 1, page 81, shows a side view of the crate. The hinged door is to allow circulation of air and freedom of access to the interior. The small wheels upon which the upper portion of the crate travels are shown at P and P. The screw eyes in the framework of the lower part of the apparatus are used (one on each side) to receive hooks attached to the cleaning table, thus holding the latter in position so that the track in the table and in the lower part of the crate will be in line. The upper part of the crate is held in position by two barrel-bolts, one on each side.

The cut on page 82 shows the front end of the crate, with the feeding door partially elevated. The lower end of this door is bent inward on a line 3½ inches from the bottom, to match the angle of the lining of the crate at the bottom of the side walls, as indicated in the cross-section drawing on page 83. The small hole near the top of the door is for the insertion of an iron pin to hold the door at a height sufficient to allow the small platform of the feed box to pass under the door as the feed box is put into place. (The feed box is shown in Figs. 1 and 2, page 85. After the feed box is secured by attaching the hook at its upper end to the screw-eye, shown above the door-way, the slide door is raised to full height and is held in place by putting the above mentioned iron pin into a lower hole. The hopper is shown with an outlet at one side, for convenience of access. The rear door (not shown in drawings) is the full height of the wall of the crate, and is hinged at the side.

The cut on page 83 shows cross sections at D—D and C—C as indicated on Fig. 1, page 81. This is largely self-explanatory. The entire crate is lined with galvanized iron. No wood whatever is accessible to the occupant. The frame of the upper screen E is made of ¼ in. x 1 in. iron. The frame of the lower screen is 3-16 in. x 3-4 in. galvanized iron.

Fig. 2, page 81, shows the upper screen, the frame having cross-pieces 14 in. apart. The lower screen has no cross-pieces. The netting on the upper screen is of 1 in. mesh, No. 9, galvanized wire. For pigs of less than 80 pounds weight the upper screen should be of smaller mesh. The netting on the lower screen is 1 in. mesh galvanized chicken wire.

Figs. 1, 2 and 3, page 84, show the construction of the cleaning tables.

Figs. 1 and 2, page 85, set forth details of the feeding box. This box has handles on each end. The small openings, closed by slide doors, are for observation and to allow of the introduction of water after the food has been consumed. The trough is held in place by the hook at the top, and by the two wrought iron bottom pieces which are so shaped as to fit down over the 1½ in. x 2 in. strip running around the bottom of the upper part of the crate.

In the use of this apparatus certain details of method and equipment are perhaps worthy of mention.

In the daily cleaning of the crates portions of the feces were removed from the upper screen with crucible tongs. The upper part of the crate, and the pig, were then shoved over onto a cleaning table where the pig was brushed or scrubbed. Other portions of the feces were scraped from the upper screen with a pointing trowel. The remaining bits of feces were then brushed through onto the cloth below by the use of painter's wire scratch brushes. The upper screen was then removed to a cleaning table where at the end of each collection period it was scrubbed on both sides with hot distilled water. From the cloth on the lower screen bits of food were removed with a counter brush and dust pan, and were then returned to the feed box to be eaten with the next meal. Bits of feces were then brushed up and added to the main portion. The cloth was then leached in hot distilled water and run through a clothes wringer. The hopper was rinsed down with hot distilled water every day and scrubbed with the same at the end of a collection period. The constituents of the scrubbings from the screen and hopper, and of the leachings from the cloth were considered to be derived from the urine, and were so credited by the addition of aliquots of the same to the urine aliquot. Special samples of urine were taken before the addition of washings for such estimations as required the pure product. A plug of thymoled cotton was kept at all times in the outlet tube of the hopper, and the urine bottles were washed and freshly thymoled each day. The day's cleaning and sampling was done in the morning. At night the urine

was again removed from the collection bottle, and kept in a refrigerated room until morning, when it was combined with the night's urine. At the time of collection of the urine of the day-time a portion of powdered thymol was put into the bottle beneath the crate to make certain that conditions were favorable for the preservation of the night's urine. At the time of making up the day's aliquots 10 c.c. of acetic acid were added to each sample to get into solution small amounts of precipitated phosphates.

Two men are able to take care of five pigs in such crates in from two or three hours daily.

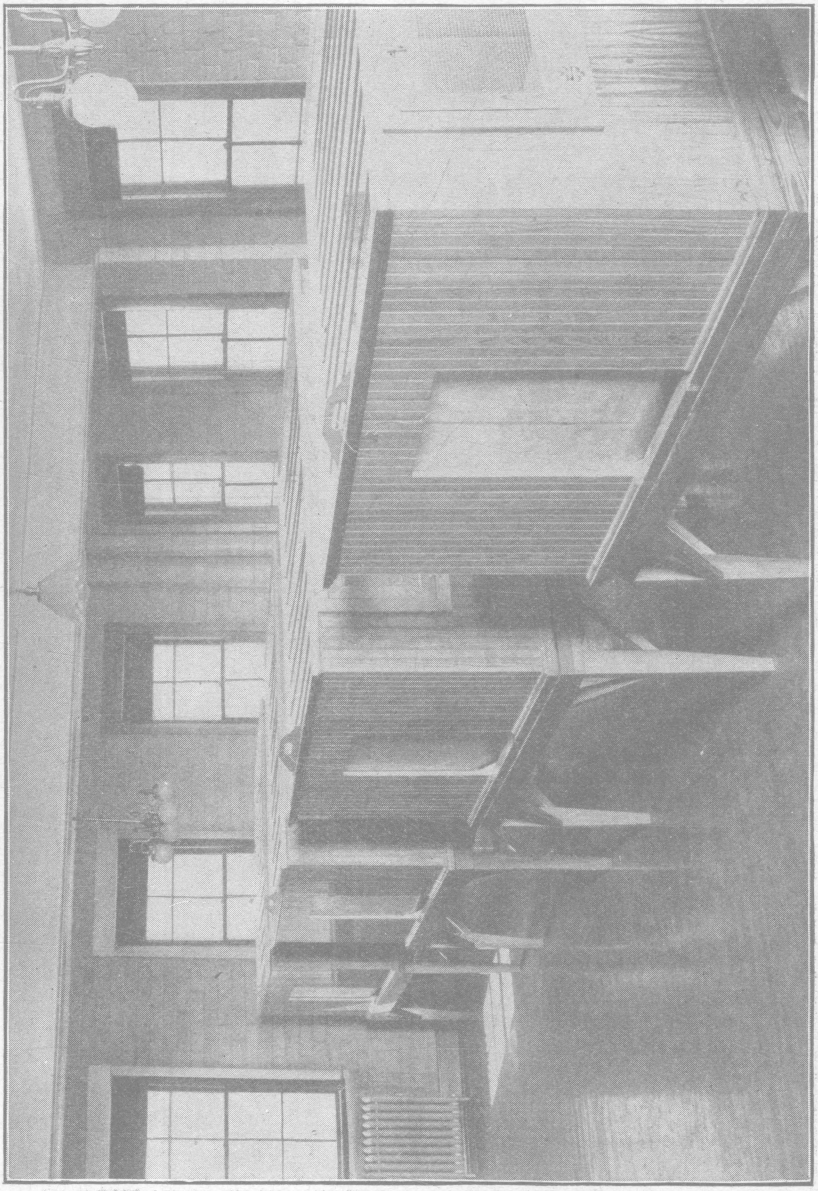
Below are separate bills for the lumber in one crate and two cleaning tables:

BILL OF MATERIAL FOR ONE METABOLISM CRATE

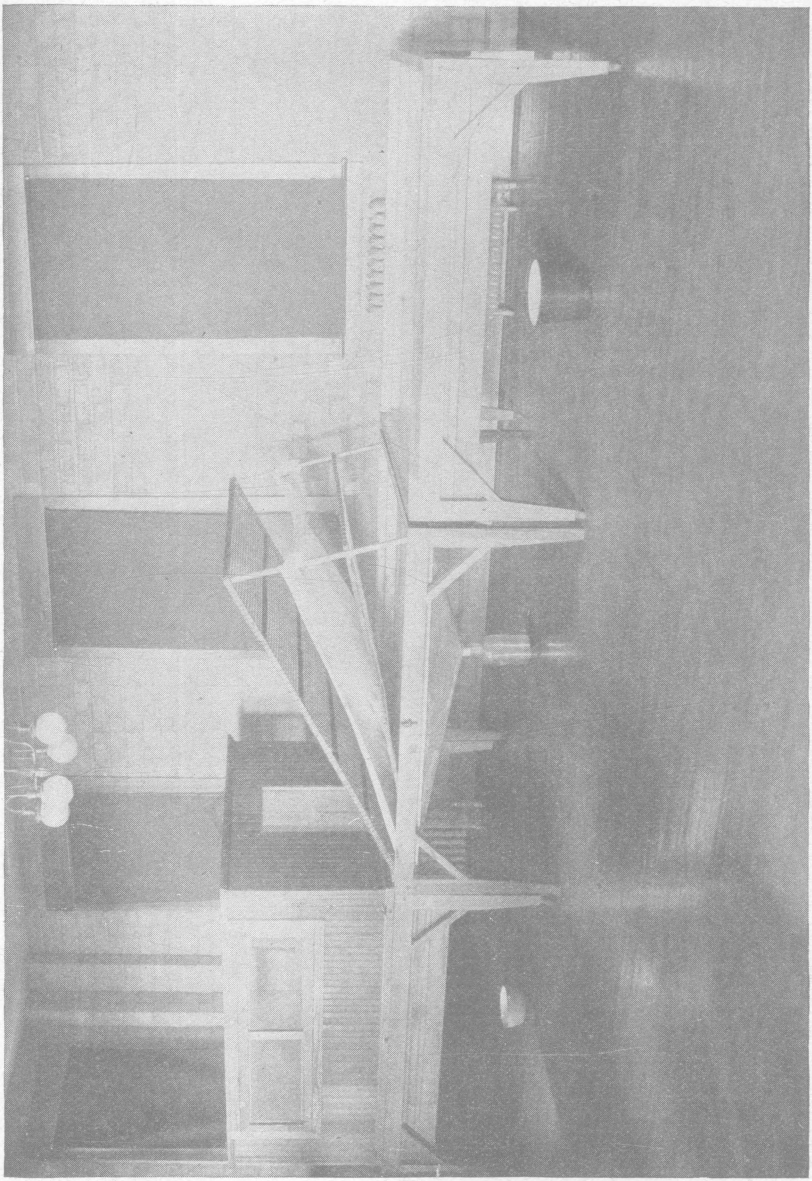
1 piece 3½ x 1½ x 10 ft. 0 in.
1 piece 3½ x 1½ x 12 ft. 0 in.
1 piece 3½ x 1½ x 14 ft. 0 in.
1 piece 3½ x 1⅝ x 12 ft. 0 in.
1 piece 3½ x 1⅝ x 14 ft. 0 in.
1 piece 2 x 1⅝ x 12 ft. 0 in.
1 piece 2 x 1⅝ x 14 ft. 0 in.
1 piece 2 x ¾ x 12 ft. 0 in.
4 pieces 2 x ¾ x 14 ft. 0 in.
5 pieces 2 x ¾ x 10 ft. 0 in.
2 pieces 1⅛ x 1½ x 12 ft. 0 in.
2 pieces 1⅛ x 1½ x 10 ft. 0 in.
13 pieces 3¼ x ¾ x 12 ft. 0 in. beaded ceiling
14 lineal ft. ⅞ cove moulding
21 lineal ft. ½ x ¾ shoe mould

BILL OF MATERIAL FOR TWO CLEANING TABLES

2 pieces 3½ x 1½ x 10 ft. 0 in.
2 pieces 3½ x 1½ x 12 ft. 0 in.
2 pieces 3½ x 1½ x 14 ft. 0 in.
2 pieces 3½ x 1⅝ x 12 ft. 0 in.
2 pieces 3½ x 1⅝ x 14 ft. 0 in.
6 pieces 3½ x 1⅝ x 8 ft. 0 in.
6 pieces 3½ x ¾ x 14 ft. 0 in. beaded ceiling
75 ft. matched sheathing



Metabolism crates as used, in series



Metabolism crate on cleaning table; screens and cloth elevated

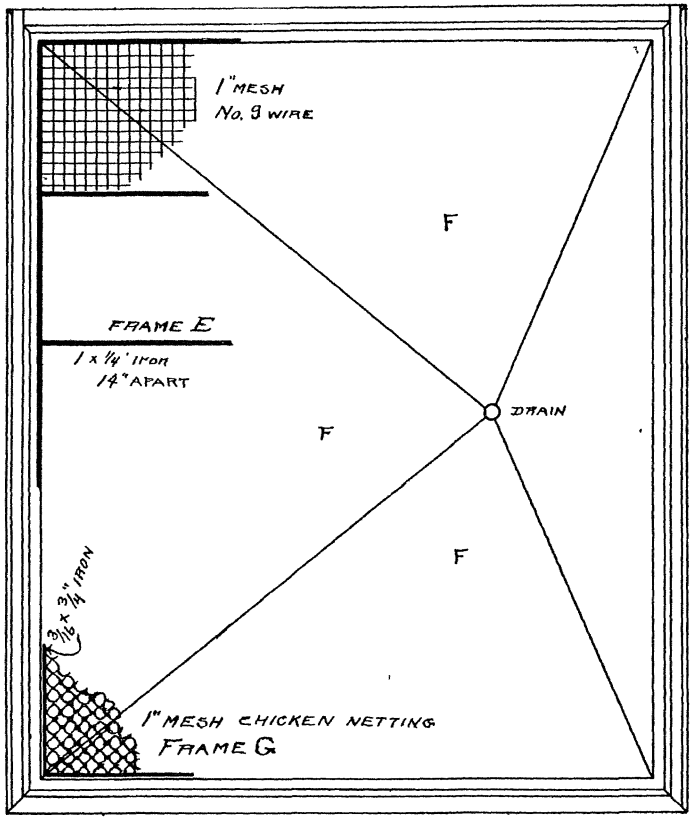


Fig. 2. Upper and lower screens

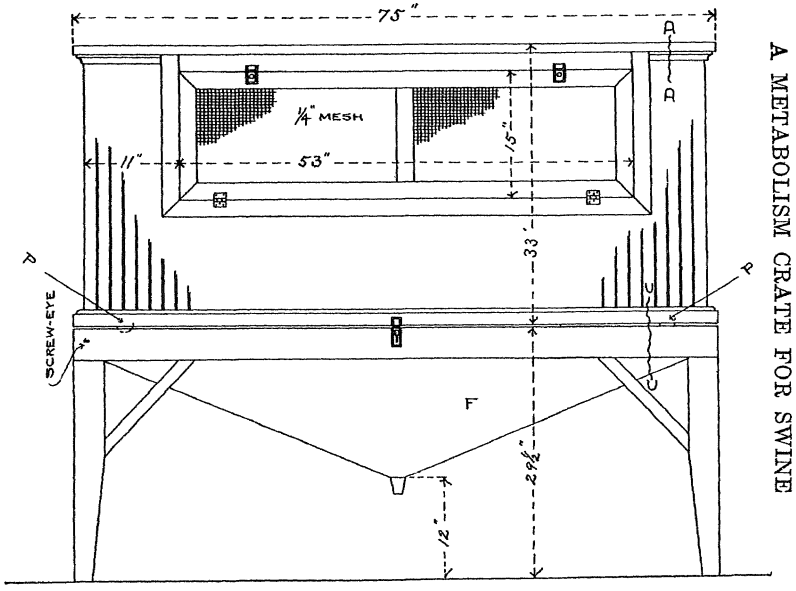
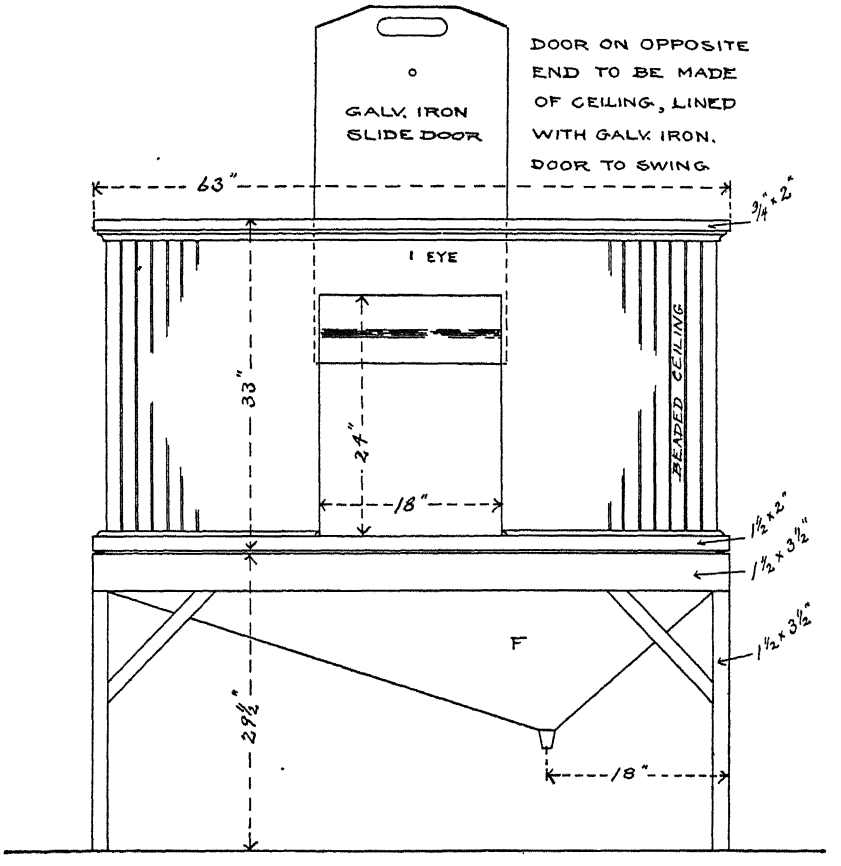
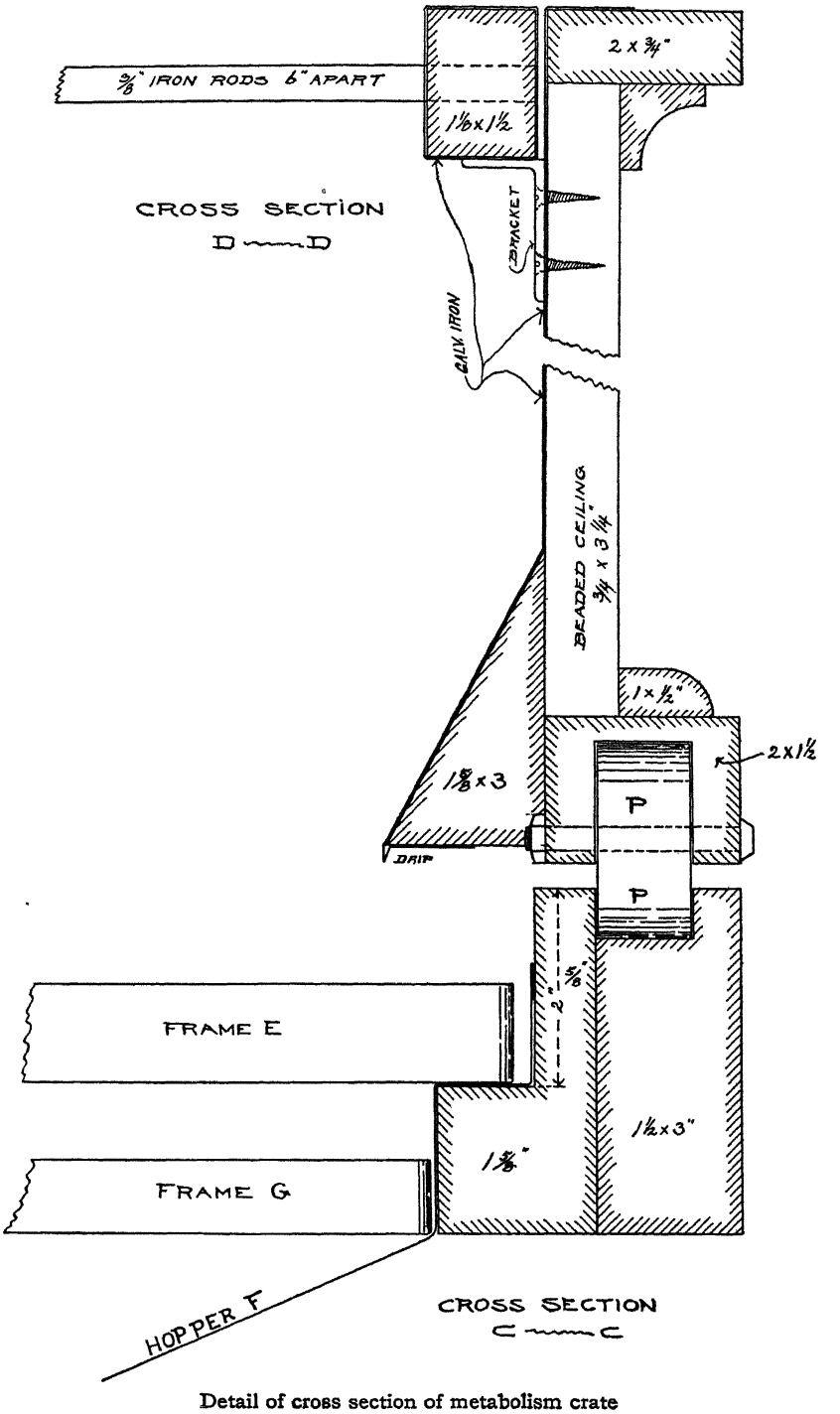


Fig. 1. Side view of metabolism crate



Front view of metabolism crate



Detail of cross section of metabolism crate

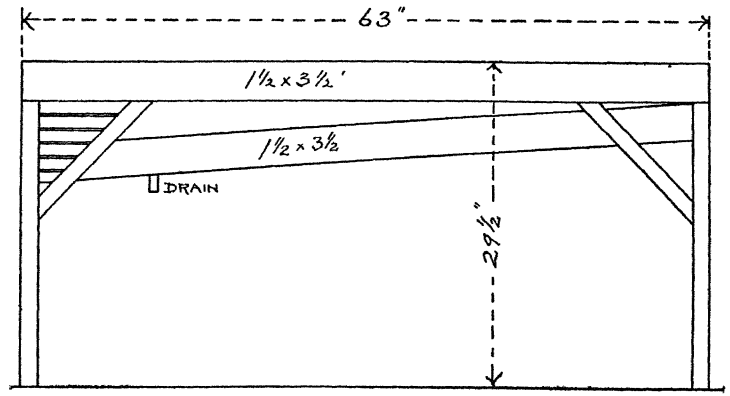


Fig. 2. Cleaning table, front view

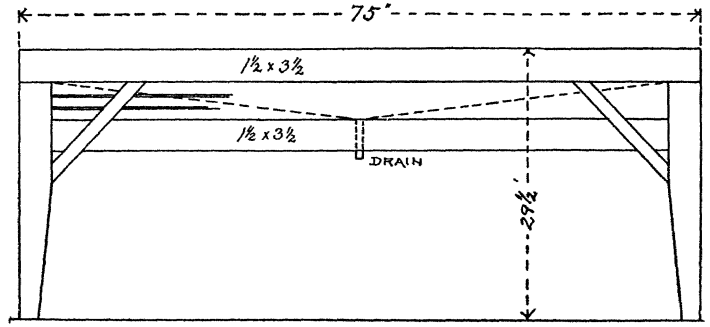


Fig. 3. Cleaning table, side view

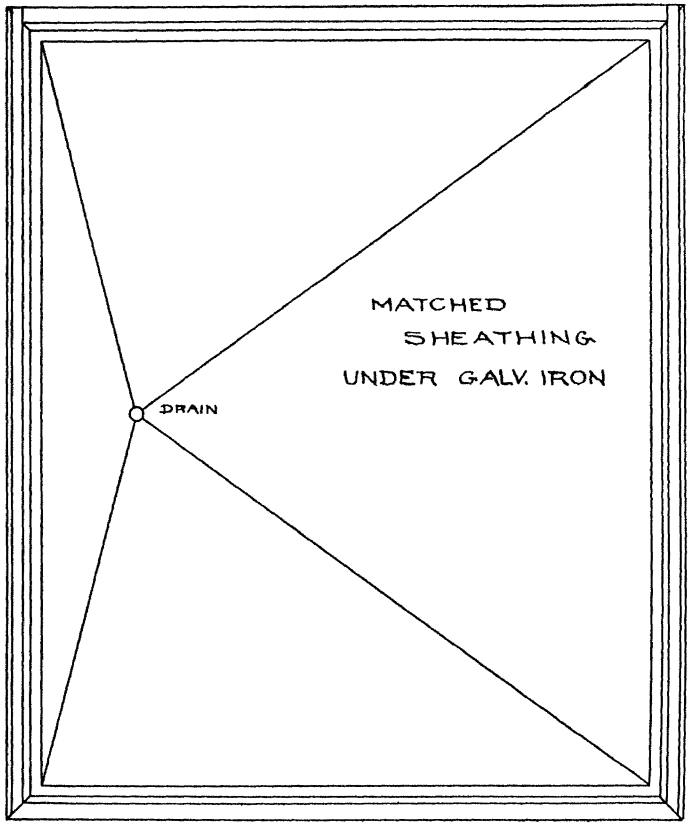


Fig. 1. Cleaning table, top view

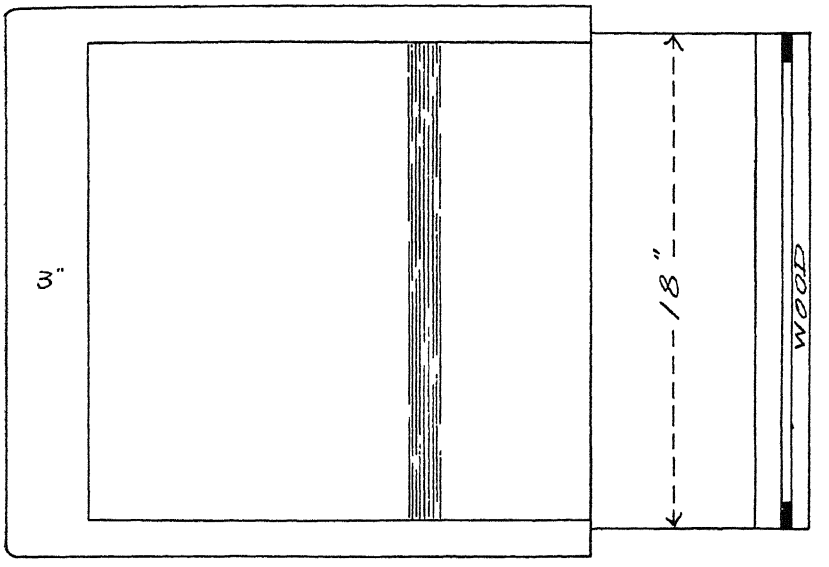


Fig. 1. Feed box, front

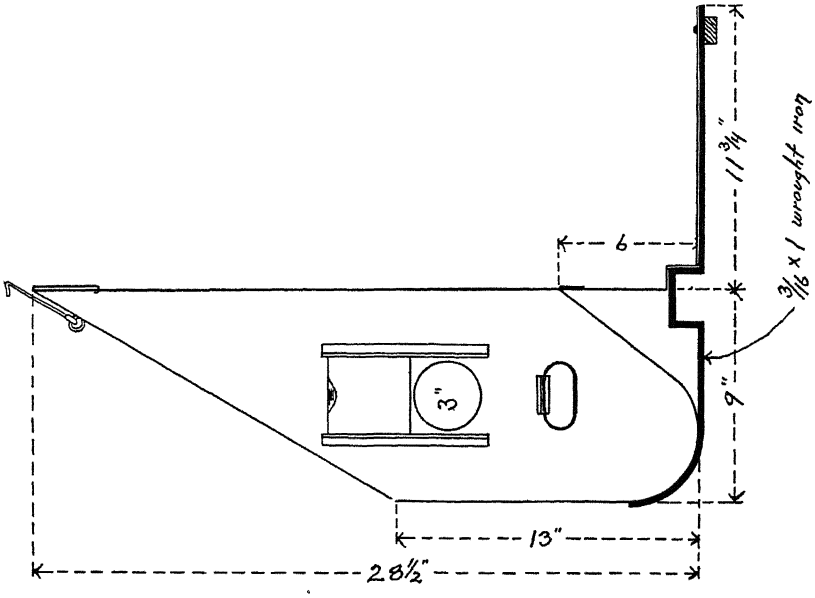


Fig. 2. Feed box, side

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